FOSSA PRÆNASALIS.

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FOSSA PRÆNASALIS.[1]

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The purpose of this paper, besides the description of a specimen, is (1) to attempt to prove that two quite different conditions are described by this name; (2) that the *fossa prænasalis* proper is not at all a simian feature, but that, while it occasionally reaches its greatest development in man, the nearest approach to it is not in the ape, but in the seal; (3) to discuss its significance.

The subject may well be introduced by a passage from Topinard's paper, "Du Prognathisme alvéolo-sous-nasale:"[2] "But the anterior border of the nose is not always simple, with a sharp crest. In the first degree it becomes dull; in a second it becomes thickly rounded, measuring in diameter from 1 to 4 mm.; in the third degree it is decomposed into two lips bounding a little triangle, which, joining that of the opposite side, forms a lozenge-shaped surface. Of these two lips, continuous with the side of the nose, the anterior bounds the nasal fossa in front; the other forms the anterior border of the anterior palatine canal. So far, the line separating the nasal fossæ and the subnasal region is clear. Now the difficulties begin." He then points out that there is occasionally a middle transverse line between the two others, and that sometimes its importance increases so that it seems to form the limit between the nose and the face. Then, again, the lozenge-shaped surface is divided into two, of which the posterior—about one-third of the whole—looks backward toward the nasal fossa, while the anterior two-thirds slant downward on the face. The anterior lip practically disappears, though

[1] This paper was to have been read at the meeting of the Association of American Anatomists during the Congress held at Washington in September, 1891. Its title appeared on the programme of the meeting, but I was unexpectedly prevented from attending. An article entitled "Ueber die onto- und philo-genetische Bedeutung der verschiedenen Formen der Apertura pyriformis," by Dr. Mingazzini, of Rome, appeared in the Archiv für Anthropologie, Bd. xx. Heft 3, which was published in October, 1891. As in some respects my views are the same as those of Dr. Mingazzini, I wish to state that, though not quite in shape for publication, my paper was originally in all essentials what it is now.

[2] Revue d'Anthropologie, tome i., 1872.

traces of it may be seen running downward in various ways. This is what he calls the double vertical gutter. "Of this," he continues, "I distinguish two degrees—one in which the inclination is moderate and traces of the anterior lip still visible; the other in which these traces join quite below the nasal spine, or are lost in the direction of the space between the two middle incisors, or between the middle and the lateral one. In this case the line of demarcation between the nasal fossæ and the subnasal surface has disappeared; they to some extent form but one, and recall a similar disposition in many apes."

"Two other striking varieties are still to be mentioned. I have met them only in the lowest types of the Melanesians.[1] The anterior and middle lips of the above-mentioned slanting surface remain strongly marked, and are separated by a deep depression—as it were, a digital one—which is elongated from above downward, measuring sometimes as much as a centimetre in length; or it may be developed crosswise, decomposing the nose into two stories—two true steps."

The two last-mentioned variations seem practically one. They constitute the true *fossa prænasalis*, differing essentially from the vertical or simian gutter. The fossa has well-marked anterior and posterior borders. The gutter is, as its name implies, a slanting communication between the nose and the face.

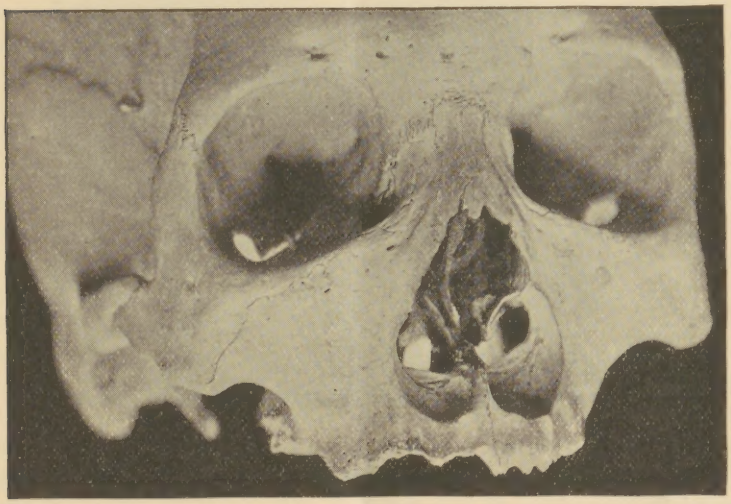
The present specimen (Fig. 1) shows two very remarkable true *fossæ prænasales*. It belongs to the Warren Museum of the Harvard Medical School, being one of the J. Mason Warren collection of skulls. It is the skull of a Sandwich Islander. The sex is probably female. The forehead is low and retreating, the superciliary ridges rather prominent. The parietal eminences are far back. There is a median depression in the region of the parietal foramina, and another in the supra-occipital. The head is brachicephalic, the index being 84.3. The teeth are wanting, but it seems from the sockets that they must have projected considerably. The skull, however, is not prognathous. The alveolar index is 101.98.[2] The nose is very broad, the nasal index being 66. There is a deep prænasal fossa on either side, the left one being much the larger. It deserves very well to be called "digital," for it suggests a hollow that might be made with the end of the finger. The lines

[1] This term is sometimes used to denote all curly-haired inhabitants of the South Sea Islands. Vide Ranke: Der Mensch.

[2] Camper's angle has become obsolete. The gnathic or alveolar index of Flower, showing the amount of projection of the upper jaw, is obtained by comparing the distance from the anterior border of the foramen magnum to the alveolar point with that from the foramen to the nasal point, the latter being called 100. A skull with an index below 98 is orthognathous, from 98 to 103 mesognathous, and above 103 prognathous.

bounding it are very sharp. The anterior ones are distinctly the continuations of the lateral borders of the nasal opening. They curve upward to the nasal spine, making the entire opening of the shape of an inverted ace of hearts. The lines bounding the fossa behind do not arise, as Topinard teaches, by the splitting of the border, but begin at the lower border of the ridge on the superior maxilla for the inferior turbinate bone, at the front of the latter bone, well inside the cavity of the nares. The prænasal fossæ, therefore, curl up on either side, inside the nose, and are bounded ~~alone~~ above by the inferior turbinate crest. On

FIG. 1.



the left this superior border is almost 7 mm. long. On the right it is poorly marked, and about half as long. The left fossa is longer, broader, and deeper than the right one. The measurements are as follows:

	Right.	Left.
Antero-posteriorly	1.5 cm.	1.8 cm.
Transversely	1.7 "	2 "
Depth	circa 0.5 "	circa 0.8 "

Both fossæ are marked by grooves, apparently caused by small blood-vessels.

This is the place to mention that there is at least an indication of a bone in the median line just back of the nasal spine between the præmaxillæ. It seems to be made by the fusion of two subvomers (*les os subvoméríens* of Rambaud and Renault), and illustrates the frequent coincidence of errors of ossification with such anomalies.

Another peculiarity of this skull deserves notice. It is a tendency to curves in the borders of openings, such as the nares, the anterior ends of the sphenoidal and spheno-maxillary fissures, and the jugular fossa. There is in all these what might be called a similarity of treatment. This is the true *fossa prænasalis*. It is a different structure from the ape-like gutter (shown in Figure 2, representing a part of another Sandwich Island skull), with which Topinard has classified it.

Fig. 2.

The literature of the subject is extremely scattered. The following synopsis has no claim to completeness. One of the earliest references is by Dr. Neill, of Philadelphia.[1] He says that in the Caucasian head there is a sharp anterior border of the nasal opening reaching to the spine. In the African this crest is wanting, the surface is flat, and the orifice of the nose resembles that of the monkey and other inferior mammalia. In the fœtus the crest or ridge is wanting and the surface flat. Now, it is clear that this description is of a simple rounding off of the anterior border, or at most of a gutter-like formation, and not of a prænasal fossa.

The following extract from a paper by Hamy, "L'épine nasale dans l'ordre des primates"[2] is very much to the point. He writes thus of the region in question: "Certainly the difference will be striking to one who has compared only the faces of an orthognathous man and of a gorilla or chimpanzee. In fact, in the white man the orifice of the nasal fossa

[1] The American Journal of the Medical Sciences, vol. xix., 1850.

[2] Bull de la Société d'Anthropologie de Paris, 1869.

is bounded by a sort of crest; in both these apes the border is quite dull [*mousse*] . . . . Thus, at first sight, the difference is great, but between these two very different faces there is a gradation of several human prognathous types, of which we have measured the forward nasal projection. Just as the face grows forward the spine becomes shorter, the crest bounding the nasal chambers is less developed and less sharp, and often is replaced by a border which approaches remarkably that of the anthropoid. In the most marked cases the nasal fossa ends in a gentle slope to which it is not possible on the skeleton to assign any anterior limit. The two inclined planes join each other at the median line, *in front of the nasal spine*, which is thus apparently thrown back into the inside of the nasal cavities. Let this arrangement be a little exaggerated and you have in man a conformation which may be compared to that which you have been able to see on the specimens and drawings of anthropoids which I have shown."

The importance of this quotation must excuse its length. It is certain that this description does not apply in the least to the skull shown in Fig. 1, but that, excepting as to the position of the nasal spine, it applies perfectly to another Sandwich Island skull in our collection, represented in Fig. 2. This is a fine specimen of the simian, or better, the vertical gutter.

Ranke, in his work on the Bavarians, expresses the opinion that this *hässliche Missbildung* is related to dolichocephaly, but that a strong proportion of such skulls in a population may account for its somewhat more frequent occurrence among short skulls than would be expected. Among the ancient Bavarians it occurred in 4 per cent. of the men and 7 per cent. of the women. It is found in 32 per cent. of the population of Ebrach. Ranke concludes as follows: "The prænasal fossæ are therefore a formation which very rarely occurs among the ancient Bavarians, and, on the other hand, remarkably often among our central German population of northwestern Bavaria. Therefore the prænasal fossæ lose their significance as signs of a low race." I must confess that it is not clear to me how many forms Ranke includes under the term.

Unless I am mistaken, Sir William Turner does not use this term in his "Challenger" reports, nor does he describe a true fossa. Of a skull from Oahu in the Sandwich Islands, he says that the sides of the nasal opening were rounded at their junction with the floor of the nose.

Zuckerkandl, in his account of the skulls of the "Novara" expedition, gives pictures of three skulls from Sumatra, Sumbawa, and Bugis, each of which presents a typical fossa. He writes as follows: "The separation of the *fossæ prænasales* from the remaining unaffected facial surface of the præmaxilla, and from the posterior plane of the floor of the

nares, is made by more or less developed ridges, convex below, which I cannot regard with Topinard as parts of the borders of the nares."

Schaaffhausen[1] states that this fossa is often found in Malays, and that it occurs particularly in races with flat noses and broad nostrils. Reviewing Zuckerkandl's work, he writes: "He wrongly blames Topinard, who considers the ridges as parts of the border of the nasal opening." This raises an interesting question as to the lines which bound the *fossa prænasalis*. That the front one is continuous with the border of the nasal opening is so evident, both in this case and in all the figures I can remember, that it is not conceivable that anyone ever questioned it. But the line bounding the fossa behind does not in this skull, nor so far as I can judge in those of the "Novara" expedition, come from the border of the nose. Concerning this it seems that Zuckerkandl is certainly right. Topinard, moreover, describes the fossa as bounded by the middle and anterior lines, though he himself teaches that the middle line is inconstant in the gutter. It is surely more natural to hold that the true fossa is bounded in fact, as well as in appearance, by the anterior line.

The distinction between the fossa and the gutter is essentially this: the fossa is a hollow distinctly separated by sharp lines both from the face and the floor of the nares; in the gutter-like formation, on the contrary, there is a passage from the nose to the face without definite beginning or end. It is impossible, therefore, to consider the fossa an exaggerated gutter. Nevertheless, there are ill-marked forms which partake of the characteristics of both, and are not quite easy to classify.

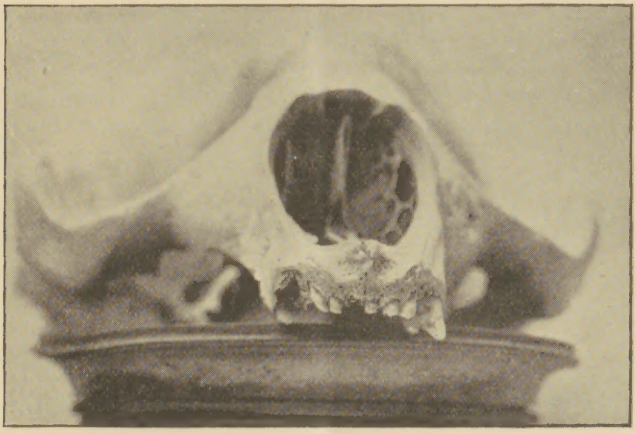
Professor Ranke is, I believe, the only authority who does not consider the fossa characteristic of a low type. It seems to occur most frequently in the Pacific islands—chiefly, apparently, in Java. I have found no account of it in Australians. I have seen at the Peabody Museum the skull of an Indian from the West Coast, in which there is a very deep true fossa on one side and none on the other.

The inferior border of the nasal opening is, as a rule, indistinct in mammals. A definite line of separation between nose and face is often wanting. The term "gutter" applies very well to the usual formation. It is to be noted that this gutter is in no way peculiar to apes, but common to the class of the mammalia. The lower border is sometimes tolerably sharp in apes and monkeys. The splitting of the outer border is sometimes seen very poorly marked in the gorilla. I have seen once a suggestion of a fossa. Decidedly the nearest approach to the true *fossa prænasalis* is to be found in the seals. Both the common *Phoca vitulina* and the *P. pagophilus* (the harp seal) show it sometimes very

[1] Archiv. für Anthropologie, Band ix., 1876.

clearly. Fig. 3 is from a photograph of the latter. It is a small fossa in the intermaxillary. The front boundary line is very characteristic. It arises from the lateral border of the opening of the nares, being at first the outer edge of the intermaxillary bone. It forms a tubercle above the outer incisor, and then turns inward, separating the anterior from the superior surface of the bone, and finally runs upward to the nasal spine. The shaded part of the bone in Fig. 3 is this anterior surface. The posterior line separates the fossa from the nares. Looked

FIG. 3.



at from above, the formation is very like a deep gutter; but if the skull be held opposite the eye, it is clear that there is a front surface above the incisors which slants somewhat backward. There is, therefore, a distinct anterior boundary of the fossa. This front surface which, of course, is an essential part of the formation, varies much among seals. It is sometimes hardly to be made out. It has just been described as slanting backward. It may do so to such a degree as to be almost horizontal. It often happens in the common seal that together with an almost horizontal position this surface becomes very small. It gives the impression that the teeth are inserted a little behind the front of the jaw. If such a specimen were seen alone, no one would suspect the presence of this anterior surface. A series of specimens, however, shows the correctness of the view I have taken.

The significance of the *fossa prænasalis* is a very interesting and a very important question. The gutter might be called a reversion, but the fossa cannot. So far as I am aware, it is found clearly marked only among the seals, a highly specialized branch of the carnivora, and among them it never reaches the development which it sometimes

presents in man. To call it atavistic is, therefore, absurd. As the finest examples of it are found in the lower races, it is impossible to consider it a progressive modification. The rounding of the lower edge in the infant is perhaps akin to the gutter, but not to the fossa. Thus we have here an anomaly in man which is neither reversive nor progressive. For my part, I cannot look on the occurrence of a similar structure in the seal as of no significance, as accidental and meaningless—like, for instance, the superficial resemblance of an anencephalous monster to a frog. The attempt has been made to account for similarity of structure in widely separated forms, as shown in the paddles of the ichthyosaurus and of the whale, by similarity of external influences. It is plain that this will not do here. The occurrence of the *fossa prænasalis* in man and seal implies a relation between distant animals other than that of heredity. It must be due to a law which we can grasp but vaguely, resting on a common plan, and, to some extent, on common tendencies.